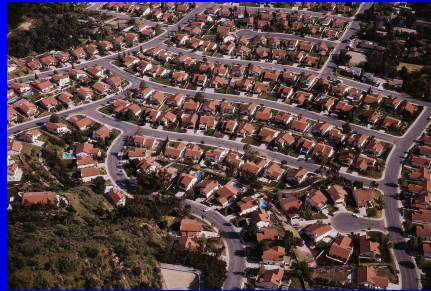


THE URBAN ENVIRONMENT AND HEALTH



June 25, 2009



Air Resources Board
California Environmental Protection Agency

Thank you Mr. Cackette. Good morning, Chairman Nichols and members of the Board. Senate Bill 375 requires the Air Resources Board to set regional targets for the purpose of reducing greenhouse gas emissions from passenger vehicles. The topic of today's health update is the additional health benefit that may accrue from implementation of Senate Bill 375 by providing an urban environment that promotes physical activity and may reduce the risk for obesity. Specifically, this presentation will focus on results from the Portland Neighborhood Environment and Health Study.

Presentation Overview

- **Background**

- Elements of urban environment
 - Definition, examples
- Obesity and overweight
 - Relationship to environment



- **Focus: Portland Neighborhood Environment and Health Study**

- Links community design and obesity



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Before I discuss the study, I am going to provide some background information. I will define the urban environment, referred to as the built environment and I will explain some of its components. I am going to discuss the obesity epidemic and how the built environment can impact obesity and overweight by influencing levels of physical activity. I will then focus on results from the Portland Neighborhood Environment and Health Study which links community design with obesity and related health issues.

Background

Elements of the Built Environment

- **Urban design - arrangement of physical elements**
 - appearance and city design
- **Land use - function of space**
 - residential, commercial, office, industrial
- **Transportation**
 - roads, sidewalks, bike paths, railroad tracks, bridges
 - traffic levels, bus frequencies



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The built environment encompasses how human activity relates to the physical environment and contains three main elements. The first is urban design which includes the design of the city and the physical elements within it. Land use typically refers to the distribution, location and density of residential, commercial, office, and industrial activities. As shown on the slide, the transportation system includes components such as roads and bike paths as well as traffic levels and bus frequencies.

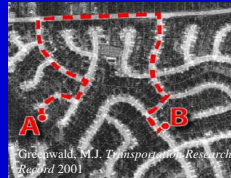
1. Handy SL, Marlon GB, Ewing R, et al. How the built environment affects physical activity: Views from urban planning. Am J Prev Med. 2002;23(2 suppl):64–73.

Background

Contrasting Examples of the Built Environment

Urban Sprawl

- Spreading of a city at fringe of an urban area
- Uses open space
- Single use zoning
- Car-dependent
- Increases pollution
- Decreased activity levels



Smart Growth

- Concentrates growth in city centers
- Preserves open space
- Compact mixed land use
- Transit-oriented, walkable
- Reduces greenhouse gases
- Promotes healthy activity



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This slide contrasts two extreme types of the built environment, although communities frequently contain aspects of both. Urban sprawl is the spreading of a city and its suburbs at the fringe of an urban area. Sprawl is characterized by a low population density so a large amount of land is urbanized in these areas. Residents of sprawling neighborhoods tend to live in single-family homes in areas with single use zoning and commute by automobile to work and other activities. The increased reliance on cars is associated with increased emissions of pollutants and decreased physical activity levels as walking and cycling are not viable transportation options. The picture on the left demonstrates the difficulties in traveling from point A to point B in an area dominated by sprawl.

Smart growth is an urban planning and transportation strategy that concentrates growth in the center of a city and preserves open spaces and utilizes existing development. Smart growth advocates mixed land use development with compact, transit-oriented, walkable, bicycle-friendly communities with a range of housing choices. Reduced reliance on cars can reduce greenhouse gas emissions. The picture on the right shows it can be simple to travel from point A to point B. Smart growth can promote public health by encouraging physical activity and facilitating social cohesiveness. As the obesity epidemic rises, questions regarding how the built environment may affect health are becoming an increasingly important research focus.

Background

Obesity and Overweight

- **Definition**

- Derived from Body Mass Index (BMI)

- **2/3 of adults are overweight/obese**

- **Increased risk for disease and death**

- High blood pressure, stroke, certain cancers, diabetes, heart disease

- **Behavior and environment influence the obesity epidemic**

- Physical activity reduces health risks (e.g., results from Women's Health Initiative)



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Obesity and overweight are defined by the body mass index which is calculated from one's height and weight. Approximately two thirds of adults in the United States are either overweight or obese. Research has shown that as weight increases to overweight and obese levels, the risks for conditions such as high blood pressure, stroke, certain cancers, diabetes, and heart disease also increases¹. In addition, preexisting conditions can be worsened. Body weight is the result of genes, metabolism, culture, socioeconomic status, behavior, and the environment. Public health officials state that the greatest opportunities for prevention and treatment of the obesity epidemic are by modifying behavior and the environment, which, in turn, should decrease health risks. For example, the Women's Health Initiative Observational Study, a very large study covering several years, found that women who exercised reduced their risk for cardiovascular disease². The relationship between the built environment, physical activity, and health was recently reported in a series of papers and is the subject of this health update.

1. NIH, NHLBI Obesity Education Initiative. Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults. Available online:

http://www.nhlbi.nih.gov/guidelines/obesity/ob_gdlns.pdf

2. Manson JE et al. Walking compared with vigorous exercise for the prevention of cardiovascular events in women. NEJM. 2002;347:716-725.

Study Description and Methods

Portland Neighborhood Environment and Health Study

- **Study area within urban growth boundary**
- **1200 residents ages 50-75 enrolled in study**
 - lived at current address an average of 8.5 years
- **Weight, height, blood pressure measured annually**
- **Participants surveyed about physical activity, transportation, dietary habits**
- **Each residence location assessed for walkability**



Li F, et al. Built environment, adiposity, and physical activity in adults aged 50-75. *Am J Prev Med.* 2008;35(1):38-46.
Li F, et al. Built environment and 1-year change in weight and waist circumference in middle-aged and older adults: Portland Neighborhood Environment and Health Study. *Am J Epidemiol.* 2009;169(4):401-8.
Li F, et al. Built environment and changes in blood pressure in middle aged and older adults. *Prev Med.* 2009;48(3):237-41.

I will be discussing findings from 3 papers that have come from the the Portland Neighborhood Environment and Health Study¹. The study's geographic area covered the Portland, OR metropolitan region's urban growth boundary. The urban growth boundary, created as part of the statewide land-use planning program, is a legal boundary to protect areas from urban sprawl and to promote the efficient use of land. The study has followed approximately 1200 residents ages 50-75 years over a one year period. The participants had lived at their current residence for an average of eight and a half years. Physiological measurements such as weight, height, and blood pressure are measured annually. Participants have been surveyed about their demographics, physical activity levels, transportation choices, and dietary habits. Each residence and neighborhood was assessed for its level of walkability, which is based on the land use mix, street connectivity, open and green spaces, and availability of public transit. Health outcomes were compared among participants living in different areas of walkability.

1. First author affiliation: Oregon Research Institute; funded by National Institute of Environmental Health Sciences, National Institutes of Health.

Results

Portland Neighborhood Environment and Health Study

- **25% lower obesity/overweight prevalence for each 10% increase in land use mix**
- **Residents in highly walkable neighborhoods lost an average of 1.2 kg (3 lbs) in one year**
 - 1.7 kg (4 lbs) overall increase in weight in all other residents
- **Residents in highly walkable neighborhoods had small decreases in blood pressure over one year**
 - Increases in blood pressure in other residents



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When first examining the study participants, the researchers found the prevalence of obesity and overweight was 25% lower for every 10% increase in mixed land use compared to residents in areas with less land use mix and more sprawl. After one year, participants, on average, gained 4 lbs while the subset of residents living in highly walkable neighborhoods who increased their activity levels lost 3 lbs. Changes in blood pressure after one year followed the same pattern, going up slightly overall, but decreasing in residents in highly walkable neighborhoods.

Conclusions

- **Built environment changes can improve public health**
- **SB 375, Steinberg, 2008**
 - Smart Growth to reduce greenhouse gases and urban sprawl
 - Potential health benefits from climate change mitigation strategies



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The research findings indicate that highly walkable neighborhoods positively influence health. This study is important because it is one of the only studies to examine the built environment and changes in health over time. However, questions remain. For example, although the average weight of all participants at baseline was the same, it is not known if the people living in more walkable neighborhoods chose those areas because they are inclined to be more active. Future research is needed to address this issue. This study focused on adults, but what is even more important is that the obesity epidemic affects children, as well. Over 30 percent of children are at risk for overweight and obesity so it is vital that we understand how to build our communities to encourage our children to be as healthy as possible.

Because the built environment constitutes an important contributor to climate change and health outcomes, alternative practices offer opportunities both for improved health and reduced climate change. This is addressed in Senate Bill 375, a bill enacted last year to assist local governments to reduce greenhouse gases via more efficient land use and transportation systems. The built environment, climate change, and public health are closely connected and strategies that reduce greenhouse gases provide opportunities both to reduce climate change and improve health. This concludes my presentation. We would be pleased to answer any questions you may have.